Space Weather Forecast

Issued on Tuesday 7 January 2025 at 13:00 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate with one Moderate-class flare observed from the largest region on the disc, peaking at 06/1624 UTC. There are now eight sunspot regions on the visible disc. The largest and most magnetically complex region, responsible for the majority of recent activity is in the northeast disc. However, whilst there has been some minor spot emergence, the overall size and complexity of the group has reduced. The remaining regions on the disc all appear smaller and simple at the present time.

A flare, peaking at 06/1624 UTC, with associated coronal dimming from the largest region would normally be considered likely to have resulted in a Coronal Mass Ejection (CME). However, nothing significant has been visible in coronagraph imagery, so confidence is low regarding this event. A CME arrival from this cannot be ruled out, but appears unlikely.

Solar Wind / Geomagnetic Activity: The solar wind environment was enhanced due to the ongoing, but slowly declining coronal hole fast wind, with a weak CME arrival around 07/0410 UTC. Solar wind speeds were elevated to strong, between roughly 500-600 km/s. The Interplanetary Magnetic Field was weak, briefly reaching moderate after the CME arrival. The north-south component varied weakly. Geomagnetic activity was Quiet to Unsettled (Kp 2-3).

Energetic Particles / Solar Radiation: Solar radiation was below the S1/Minor Storm threshold, but slightly above normal background levels (on a declining trend).

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is likely to be Moderate, with a slight chance of isolated Strong flares, primarily from the largest region on the disc. Given that this region has been declining in complexity, the flare risk is reduced compared to the previous forecast.

Solar Wind / Geomagnetic Activity: A CME arrived overnight as a weak glancing blow, although it has increased the wind speed again to strong levels. A flare peaking at 06/1624 UTC would normally be considered likely to have resulted in a CME. However, nothing significant has been visible in coronagraph imagery, so confidence is low, but a CME arrival from this cannot be ruled out. Earth has been connected to a coronal hole fast wind. Solar winds were declining slowly until the CME arrival, but the gradual decline is likely to resume, perhaps coming down to background

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or slightly elevated levels in the next few days. The next coronal hole enhancement is possible later on Day 4 (10 Dec), but speeds are unlikely to be much more than 400km/s.

Geomagnetic activity is expected to be mostly Quiet to Unsettled. There is a slight chance of Active to G1/Minor Storm conditions on Day 1 (07 Jan) with the current strong wind speeds, and again later in the period with the fast wind onset and uncertainty regarding the CME forecast.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is below the S1/Minor Storm threshold, but slightly above normal background levels (on a declining trend). There is a slight chance of exceeding the S1/Minor Storm threshold during the period.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	60	60	60	60
Very Active	R3-R5 (X Class)	No	5	5	5	5

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	20	20	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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